Mathematics Homework Feedback from the Perspective of Mathematics Teachers and Students[1]

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Abstract

This study aimed to investigate how mathematics teachers' feedback on homework is perceived from both teacher and student perspectives. A phenomenological research design was employed, involving six elementary school mathematics teachers and six middleschool students from a provincial center in Eastern Anatolia. Data were collected through online focus group discussions and analyzed using descriptive analysis. Teachers primarily perceived feedback as "homework control" and emphasized its role in identifying deficiencies, reinforcing learning, and fostering questioning skills. However, time constraints were a major challenge in providing feedback. In distance education, technological problems and reduced teacher-student interaction negatively affected feedback processes, while face-to-face education enabled more accurate evaluation and effective feedback. Students generally perceived feedback as superficial and symbolic but acknowledged its motivational impact. They also highlighted the advantages of face-to-face feedback over distance education. The findings suggest that feedback should be more constructive and process-oriented to enhance both teaching effectiveness and student learning outcomes.

Keywords: Feedback, homework, homework feedback, mathematics teachers, mathematics education

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[1] This article is derived from a master's thesis conducted by the first author under the guidance of the second author.

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Introduction

Assignments are defined as tasks given by teachers to promote students' learning outside the classroom and encourage deeper thinking (Cooper, 1989) and are a widely recognized educational practice worldwide (Xu, 2024a). Homework serves as a key tool for reinforcing knowledge, developing problem-solving skills, and fostering independent study habits (Fan et al., 2017; Xu, 2022; Dobbs et al., 2025). It significantly contributes to students' cognitive and academic development (Arıkan, 2017; Fernández-Alonso et al., 2015) while also enhancing time management and responsibility (Özcan & Erktin, 2015; Xu & Corno, 2006). However, the effectiveness of homework largely depends on the quality of the assignments and the feedback provided (Avcı et al., 2025; Núñez et al., 2015).

Addressing the call for more subject-specific homework studies (Trautwein et al., 2006; Xu & Corno, 2022), this research focuses on mathematics homework, which teachers assign more frequently than in other subjects (Cunha et al., 2019; Fernández-Alonso et al., 2015). Mathematics homework reinforces abstract concepts through repetition and practice (Özcan & Erktin, 2015; Xu & Wu, 2013), consolidates classroom learning (Güven & Akçay, 2019; Rosário et al., 2019), and fosters greater academic engagement and success (Gou et al., 2024; Xu et al., 2022). Prior studies affirm that it supports analytical thinking, strengthens self-confidence, and enhances students' motivation to learn (Arıkan, 2017; Dettmers et al., 2010; Ergen & Durmuş, 2021; Núñez et al., 2015; Özcan & Erktin, 2015).

In mathematics courses, which require analytical thinking and problem-solving skills, regular monitoring and evaluation of homework assignments are crucial. However, for homework to be effective, providing it alone is insufficient; teachers must also deliver effective feedback (Xu et al., 2022). Feedback, broadly defined as "information provided by an agent (e.g., teacher, peer, book, parent, individual, experience) about various aspects of performance or understanding" (Hattie & Timperley, 2007), is among the most effective strategies to support student learning (Avcı et al., 2025; Xu, 2024a). Teacher feedback, specifically focusing on aspects of student performance (Hattie & Timperley, 2007), plays a critical role in homework models such as homework completion and performance (Trautwein et al., 2006). Within this context, homework feedback refers to the evaluation and guidance provided during in-class follow-up of homework completion (Cooper, 2007). Different approaches to homework feedback-such as checking homework on the board, providing constructive feedback, offering praise or criticism, using rewards, or grading homework-have been suggested (Cunha et al., 2018).

In educational contexts, the effectiveness of feedback depends less on its quantity and more on how students perceive and interpret it (Hattie & Timperley, 2007). Research emphasizes that individuals' perceptions of feedback are crucial for its effective use and for enhancing learning and performance (Van der Kleij, 2019; Xu, 2024a). The perceived quality of feedback significantly influences its impact, as its effectiveness is shaped by how recipients interpret it (Esterhazy et al., 2020).

Therefore, students' perceptions of teacher feedback are critical for achieving positive instructional outcomes (Hargreaves, 2013).

In mathematics education, research on teachers' homework feedback has primarily focused on its effects on learning, performance, and affective factors. Studies have shown that feedback increases students' homework completion rates and improves mathematics achievement (Núñez et al., 2015; Rosário et al., 2019; Xu, 2022; Xu et al., 2022; Xu & Wu, 2013). Detailed feedback helps students recognize mistakes and enhances their problem-solving skills, especially in step-by-step processes required in mathematics (Rosário et al., 2019). Homework feedback also supports cognitive development by facilitating problem-solving related to assignments (Núñez et al., 2015; Rosário et al., 2019). Regarding affective factors, feedback has been found to boost students' interest, motivation, and positive attitudes towards homework (Núñez et al., 2015; Xu, 2022; Xu et al., 2022; Xu & Wu, 2013). Positive emotions toward homework, fostered by feedback, are important for improving problem-solving skills and strengthening commitment to learning (Gou et al., 2024). Moreover, frequent and constructive feedback encourages students to spend more time on mathematics homework and develop a more positive attitude (Xu et al., 2022).

From teachers' perspectives, the feedback process is a key tool for improving lesson efficiency and monitoring students' learning progress (Xu, 2024a). Feedback enables teachers to assess students' understanding, identify areas of difficulty (Rosário et al., 2019), and refine their instructional practices (Cunha et al., 2019). It also helps teachers address individual learning needs and develop more effective strategies (Gou et al., 2024). Beyond assessing current performance, constructive feedback encourages students to think critically, fosters self-confidence, and guides them in recognizing and addressing their shortcomings (Xu et al., 2024b).

Most research in mathematics education has focused on the effects of feedback on mathematical performance, academic achievement, and affective factors, yet largely from a quantitative perspective without deeply exploring how feedback is perceived and how these perceptions influence learning (Núñez et al., 2015; Rosário et al., 2019; Xu, 2022, 2024a, 2024b; Xu et al., 2022). In Türkiye, studies on mathematics homework are limited and mainly address teacher and student views (Ergen & Durmuş, 2021; Kaplan-Can & Gelbal, 2022), international assessment evaluations (Arıkan, 2017; Güven & Akçay, 2019), and the role of homework in improving achievement (Özcan & Erktin, 2015). Given that perceptions of feedback are crucial for its effective use in supporting learning, the lack of research on this topic is notable. The limited focus on teachers' and students' perceptions forms the main rationale for this study (Cunha et al., 2019; Trautwein & Lüdtke, 2009; Xu, 2024a, 2024b). Moreover, most prior research has been conducted outside Türkiye, making this study significant for understanding feedback processes in the Turkish mathematics education context.

This study aims to examine how mathematics teachers' feedback on homework assignments is perceived from both teacher and student perspectives. In this context, a more comprehensive examination of students' and teachers' perceptions of feedback is expected to provide important findings for more effective use of feedback in mathematics education. This study is important in terms of expanding the knowledge in the field of mathematics education by making an innovative contribution to the limited number of studies on both teachers' and students' perceptions of feedback. In addition, the study is expected to provide results that will enable teachers to develop more effective feedback strategies and contribute more to students' learning processes. In this context, the main problem of the study is shaped around the question "What are the views of teachers and students on the feedback given by elementary mathematics teachers to homework assignments?". In line with this main problem, answers to the following questions were sought: Mathematics teachers,

1. How do they define feedback?

2. What are their views on the necessity and benefits of feedback?

3. What are the points he/she pays attention to when giving feedback?

4. What are the difficulties they face in giving feedback?

5. What are the advantages and disadvantages of their feedback during distance education and face-to-face education periods?

Within the framework of the same problem, answers to the following questions were sought in order to understand the views of middle school students: Middle school students,

1. How do they define feedback?

2. What are their views about the necessity of feedback and its contribution to mathematics achievement?

3. What are their views on what kind of feedback they would like to receive?

4. What are the advantages and disadvantages of the feedback they receive during distance education and face-to-face education periods?

Method

Research Design

In this study, phenomenology, one of the qualitative research designs, was used. Phenomenology design requires a careful and in-depth description of how individuals perceive, describe, remember, make sense of, and understand the phenomenon. Phenomenology design provides access to in-depth information that cannot be obtained through quantitative methods (Patton, 2014). It is assumed that a subjective phenomenon such as homework feedback is perceived and experienced

differently by each individual (Xu, 2024a). In this context, the phenomenological approach allows teachers and students to understand these experiences directly from their own perspectives. Therefore, using this design was seen as an effective approach to reveal the subjective experiences and perceptions of the participants. The phenomenon addressed in the study is the perceptions and experiences related to the quality of feedback and its impact on teaching and learning processes. In other words, the phenomenon focused on in the study is how feedback on mathematics assignments is interpreted by both students and teachers and how these interpretations are reflected in the teaching and learning process.

Participants

The participants of this study consisted of 6 mathematics teachers working in a city center in the Eastern Anatolia Region and 6 middle school students taking lessons from these teachers. The participants were selected using criterion sampling, one of the purposive sampling methods. Criterion sampling is based on the study of cases that meet a set of criteria determined by the researcher or prepared in advance (Patton, 2014). The criteria for selecting mathematics teachers for the study were as follows: teachers' regular feedback on mathematics homework, at least five years of professional experience, and having worked in all grade levels of middle school. The focus of the study was on teachers' feedback on mathematics homework. Therefore, the fact that teachers regularly provide feedback on homework is critical for gaining in-depth knowledge about their feedback processes. The criterion of five years of professional experience is intended to ensure that teachers have sufficient experience in classroom management, teaching methods and feedback processes. More experienced teachers may be more effective in providing feedback on assignments and more competent in assessing student performance and providing constructive feedback. Teachers' experience in all grade levels of middle school may enable them to have a broader perspective on the needs and developmental levels of students in different age groups. This diversity may allow for a more comprehensive assessment of the approach teachers take when providing feedback. Also, demographic characteristics of teachers are given in Table 1.

In the selection of student participants, eighth-grade students who regularly did their homework in line with their teachers' views were preferred. The main reason for selecting students from the eighth-grade level was that the students stated that they had received homework assignments at lower grade levels and therefore, students at this grade level had more experience in doing homework. This rationale was also taken into consideration in Xu's (2024b) study. The study group consisted of six students, including three girls aged 13 and two students (one girl and one boy) aged 14. The participants' ages ranged from 13 to 14 years. In the study, teachers were coded as T1, T2, ..., T6, and students were coded as S1, ..., S6.

Table 1. Demographic characteristics of the participating teachers

Code	Gender	Seniority (years)	Bechelor's degree (university/department)	Age
T1	Famale	7	Elazığ Fırat University EMTE	29
T2	Female	9	Elazığ Fırat University EMTE	32
T3	Female	6	Elazığ Fırat University EMTE	28
T4	Male	18	Van Yüzüncü Yıl University EMTE	41
T5	Male	7	Elazığ Fırat University EMTE	30
T6	Male	12	Malatya İnönü University EMTE	35

*EMTE=Elementary Mathematics Teacher Education

As indicated in Table 1, the professional seniority of the teachers ranged between 6 and 18 years, and all of them graduated from the department of elementary mathematics teaching.

Instruments

In this study, a semi-structured interview form consisting of 9 open-ended questions was used to obtain both teacher and student views on the feedback given by elementary mathematics teachers on homework assignments. During the development of the data collection tool, the literature on mathematics homework, feedback, and teacher and student views was reviewed (e.g., Núñez et al., 2015; Rosário et al., 2019; Xu, 2024a). Based on the information obtained, semi-structured interview forms were prepared separately for teachers and students by the researchers. The interview forms were submitted to expert view to be evaluated in terms of suitability for the purpose, language, content and comprehensibility. Necessary corrections were made in line with the expert feedback and the questions in the interview forms were finalized.

In order to test the level of understanding of the questions and the emergence of possible problems, focus group interviews were conducted with 6 teachers and 6 students separately online. In these interviews, questions that were revised after expert view were used. At the end of the pilot study, it was determined that the questions were clearly understood and there were no problems. In addition, it was concluded that the duration of the research was not boring for teachers and students and the level of understanding of the questions was appropriate.

Data Collection Process

In the study, data were collected through focus group interviews. A focus group interview is an interview with a small group of participants on a specific topic. Groups usually consist of 6 to 10 people with similar past experiences and the interview lasts between 1 and 2 hours. A focus group discussion is not a problem-solving session, nor is it a decision-making group. It is an interview, not a discussion, although direct interactions between participants often occur (Patton, 2014). Focus group interviews were conducted separately with teachers and students. There are some reasons for collecting data

through focus group interviews. First of all, the focus group interview is an ideal data collection method to examine feedback perceptions from both teacher and student perspectives in depth in line with the purpose of the study. The interaction between the participants allows for rich and varied data, while group discussions allow individuals to deepen their ideas. Moreover, this method saves time and allows for efficient collection of information from large groups of participants.

The data collection process was carried out separately with teachers and students online and audio and video recordings were taken throughout the process to ensure data security and accuracy. In the first stage of the focus group interview, the definition of the method, the functioning of the interview process and the purpose of the research were explained to the participants with a detailed presentation, so that the participants fully understood the process and their active participation was encouraged. During the interview process, the nine questions prepared by the researcher were projected one by one on the screen and the participants' views were taken, which ensured that the focus group interview was structured and the issues identified were discussed in depth. In addition, an effective interaction environment was created among the participants, encouraging them to express their thoughts freely. The interview was completed in an average of 90 minutes with a group of participants consisting of teachers and students, and the process was accompanied by a professor specialized in mathematics education and a mathematics teacher from the Ministry of National Education, who provided expert support and scientific guidance. These elements ensured that the focus group interview was conducted in accordance with the principles of validity, reliability and in-depth exploration of participants' views.

Validity and Reliability

Some measures were taken to ensure credibility and transferability and consistency in the study (Merriam, 2018). In qualitative research, the authenticity of the research process and the results obtained is of great importance. In this study, in order to ensure credibility, data were collected with an unbiased approach and direct quotations were included to increase the accuracy of the findings. In this way, the findings of the study were presented to the reader in a more concrete and convincing way. Regarding transferability, Erlandson et al. (1993) emphasized that the transferability of research results to other contexts can be increased through detailed descriptions and purposeful sampling. Sharts-Hopko (2002) stated that presenting the participant selection process and participant characteristics in qualitative research in detail would support transferability. In this study, criterion sampling method was used to ensure transferability and detailed information about the participants was provided. In order to ensure the consistency of the study, we collaborated with an expert mathematics educator. The transcripts of the video recordings and the coding of the data were carried out independently, then the analyses were compared, the differences were discussed and a common decision was reached. In the process of formulating the questions, expert views were utilized, pilot studies were conducted, and the questions were finalized based on the feedback received. In this process, an academician (professor) who is an

expert in mathematics education was worked with. In addition, the compatibility of the findings, interpretations and recommendations obtained during the study process with the raw data was evaluated and verified by an expert mathematician. This process aims to increase the objectivity of the research and the reliability of the findings. These approaches were planned and implemented to support the scientific validity and reliability of the study.

Data Analysis

The data obtained in this study were analyzed using descriptive analysis method in line with the sub-problems of the research. Descriptive analysis involves the process of organizing the data according to a specific theme or question and interpreting them in this context. In this method, the data obtained in line with predetermined themes or research questions are summarized and interpreted in a meaningful way (Miles & Huberman, 1994). Accordingly, the study focused on both teacher and student views. In the data analysis process, firstly, the relevant data for each sub-problem were analyzed within the framework of descriptive analysis. The data were analyzed in detail through the transcripts of the audio and video recordings, and then these data were categorized within the framework of the questions identified. First, the views of teachers and students were classified into meaningful themes and categories through descriptive analysis (Miles & Huberman, 1994). In this study, in order to increase reliability in the data analysis process, independent coding was performed by two experts and the consistency of the coding results was evaluated. The inter-coder reliability formula suggested by Miles and Huberman (1994) was used to calculate inter-coder reliability. In the study, after independent coding by two coders, agreements and disagreements were determined, and then the inter-coder reliability rate was calculated as 89% with the help of the formula. Content with inconsistent coding was discussed and consensus was reached.

The descriptive analysis method enabled the participants' views to be presented more clearly and concretely, as it allowed the data to be supported by direct quotations. Through this method, both teachers' and students' perceptions and experiences of feedback were presented in detail. The descriptive analysis used in the study also enabled the data to be handled systematically (Creswell & Poth, 2016) and the sub-problems to be answered.

Results

Mathematics Teachers' Views on the Feedback They Provide for Homework

Teachers' Views on Defining Feedback

The codes for the views obtained from the teachers regarding the sub-problem "How do elementary mathematics teachers define feedback?" are presented in Table 2.

Table 2. Teachers' views on defining feedback

Code	f
Homework checking	5
Not defined	1

*f=Frequency

According to the obtained codes, teachers generally defined the concept of feedback as homework checking. This finding provides important insights into how teachers experience feedback processes. For teachers, homework checking appears to represent a practical and routine application of feedback. This experience suggests that teachers predominantly perceive feedback as a tool for monitoring students' work. For instance, one teacher described the feedback process as follows: "Actually, we assign homework to reinforce what we teach in the classroom, so it should be checked one-on-one as feedback" (T3). This quote reveals that the teacher views feedback as a means of guiding students and correcting their deficiencies. However, the fact that one teacher could not fully define the concept of feedback indicates a limited understanding of feedback not only as a supervisory mechanism but also as a process that guides student learning and enhances the quality of learning. This situation suggests that the feedback processes experienced by teachers tend to be more superficial and outcome-oriented.

Teachers' Views on the Necessity and Benefits of Feedback

The categories and codes for the views obtained from the teachers regarding the sub-problem "What are the views of elementary mathematics teachers on the necessity and benefits of feedback?" are given in Table 3.

Table 3. Teachers' views on the necessity and benefits of feedback

Category	Code	f
The necessity of feedback	Need for feedback	6
	Understanding whether the topics have been learned	6
	Identifying students' deficiencies	2
	Reinforcement	1
	Developing inquiry skills	1
	Teacher self-assessment	1
Benefits of feedback	Identifying subject deficiencies	3
	Learning practical methods	2
	Achieving permanent learning	2
	Increasing interest in the course	1
	Correction and relearning	1

As shown in Table 3, all teachers emphasized the necessity of the feedback process. This indicates that feedback is experienced as a fundamental element of the teaching process and is considered an indispensable tool by teachers. One of the main reasons why teachers view feedback as necessary is their desire to monitor students' learning processes and identify their deficiencies. This

experience reveals that teachers value feedback as a means to track student development. Teachers' experiences also highlighted that feedback serves not only to transmit information but also to enhance students' thinking and inquiry skills. Additionally, one teacher stated that feedback is necessary for reinforcement, explaining: "When we provide feedback, we can understand that the student has reinforced the topic as well" (T2). This view indicates that teachers perceive feedback not merely as a tool for checking knowledge but also as a means to reinforce learning. Moreover, teachers also pointed out that feedback is essential for helping students develop inquiry skills. From the students' perspective, feedback was also reported to be beneficial. Through the feedback provided, teachers can identify the gaps in students' subject knowledge and actively contribute to their learning processes. For example, teacher T3 stated, "Students can see how much they are lacking in a particular topic", while teacher T5 added, "Even if they have done it correctly, feedback enables them to learn faster and more practically, ensuring permanent learning". These statements highlight the multifaceted role feedback plays in supporting student achievement.

Teachers' Views on the Aspects They Pay Attention to When Providing Feedback

What are the aspects that elementary mathematics teachers pay attention to when providing feedback? The codes derived from teachers' responses to this sub-problem are presented in Table 4.

Table 4. Teachers' views on the aspects they pay attention to when providing feedback

Code	f
Reviewing the solution	4
Assessing learning outcomes	2
Evaluating the problem solving process	2
Providing feedback on the board	2
Investigating the source of the error	1

When Table 4 is examined, it is evident that the majority of teachers emphasized the importance of reviewing students' homework solutions. This finding indicates that teachers generally focus on students' outcomes and attach significant importance to the correctness of the solutions. Teacher T6 elaborated on this point as follows: "The most important feedback here is to check whether the solutions have been completed or not.". One of the crucial elements considered by teachers when providing feedback is the evaluation of students' mastery of learning outcomes. This experience was expressed by one of the teachers as follows: "I pay attention to whether the student has learned the intended outcomes" (T2). This statement highlights that teachers not only value the correctness of answers but also prioritize whether students have internalized the learning process itself. Additionally, two teachers mentioned that they evaluate the problem-solving process and provide feedback directly on the board. However, for some teachers, the feedback process still tends to focus primarily on correcting students' errors. The attention that teachers pay to students' mistakes and learning stages during feedback suggests that they

perceive feedback not merely as an assessment tool but as a guiding mechanism that supports students' development.

Teachers' Views on the Difficulties Encountered During the Feedback Process

The codes derived from teachers' responses to the sub-problem "What are the difficulties encountered by elementary mathematics teachers during the feedback process?" are presented in Table 5.

Table 5. Views on the difficulties experienced by teachers in giving feedback

Code	f
Time constraints	6
Lack of clarity of the solutions	3
Class size	1

The experiences of teachers during the feedback process were marked by various challenges. Among these, the most prominent difficulty was time constraints. All participating teachers reported experiencing a lack of time when providing feedback. This indicates that the inability to allocate sufficient time for effective feedback negatively impacts the overall process. For instance, teacher T1 stated: "My biggest problem during the feedback process is the limited class time we have". This statement clearly illustrates the pressure time constraints place on teachers and how they hinder their desire to manage the feedback process more effectively. In addition to time limitations, teachers also faced challenges related to large class sizes and difficulties in understanding students' solutions. Teacher T5 addressed this issue by stating: "Although the student has reached the correct answer, they often fail to provide an explanatory response. They tend to give quick or superficial answers. I pay close attention to whether the solution part is detailed and understandable". These experiences demonstrate that teachers often cannot find the necessary conditions to achieve an ideal feedback process and that instructional conditions have a limiting effect on the quality of feedback provided.

Teachers' Views on the Advantages and Disadvantages of Feedback Provided During Distance and Face-To-Face Education

The analysis results of teachers' views regarding the sub-problem "What are the advantages and disadvantages of the feedback provided by elementary mathematics teachers during distance and face-to-face education periods?" are presented in Table 6.

Table 6. Teachers' views on the advantages and disadvantages of feedback provided during distance and face-to-face education

Category	Code	f
Disadvantages during the distance education	No advantage	6
	Technological challenges	3
	Inability to give physical feedback	2
	Inability to communicate with students	2
Advantages during the face-to-face education	Ability to evaluate effectively	4
	Supportive feedback	1
	Provideing physical feedback	1
	Ability to communicate with the student	1

Teachers stated that providing feedback during distance education involved significant challenges and that they did not perceive any advantages in the feedback process during this period. For instance, teacher T1 commented: "Since it was difficult for students to convey their homework to us, it was also very difficult for us to provide feedback. I definitely do not think there was any advantage in providing feedback during distance education.". This finding points to the fact that teachers could not maintain an effective feedback process with students due to insufficient technological infrastructure. Similarly, teacher T2 addressed technological problems by saying: "Then there were system errors. Sometimes the system would throw the student out. Even if the student answered correctly, the feedback would remain incomplete because by the time the student reconnected, we would have already moved on to another question.". Teachers also highlighted that they could not provide physical feedback and that the inability to establish one-on-one communication with students negatively affected the feedback process. These experiences reveal the negative impacts of the breakdown in student-teacher interaction and the inefficiency of the feedback process during distance education. In contrast, during face-to-face education, teachers reported that they could engage in a healthier feedback process with students. Teacher T3 expressed: "During face-to-face education, when the student is right in front of us, we can tell from their actions and expressions whether they spent enough time on their homework or did it willingly and enthusiastically, which allows us to provide better feedback". This statement shows that teachers believe they can more closely monitor students' academic development and provide more effective feedback in face-to-face settings. Furthermore, during face-to-face education, four teachers indicated that they could evaluate students' homework processes more effectively, one mentioned providing supportive feedback, and another pointed out the advantage of offering physical feedback. These findings indicate that while the bond with students and the feedback process weakened during distance education, teachers believed they could offer more effective feedback during face-to-face education.

Students' Views on Homework Feedback

Students' Views on Defining Feedback

The codes for the views obtained from the students regarding the sub-problem "How do middle school students define feedback?" are shown in Table 7.

Table 7. Students' views on defining feedback

Code	f
Giving positive/negative marks	6
Saying "well done" and using gestures	2
Asking the reason for incomplete homework and solving it in class	2
Giving rewards	1

Students predominantly associated feedback with superficial and symbolic responses such as "giving positive/negative marks" and "saying well done". This finding suggests that students' experiences with feedback are largely limited to simple affirmations and encouragements provided by their teachers. For instance, one student defined feedback as follows: "When our teacher gives homework, they put a plus or minus sign" (S2). This statement reveals that students perceive feedback as a direct, brief, and motivating experience from their teachers. For students, feedback is primarily understood as a form of validation and guidance received from their teachers, which not only supports their academic development but also addresses their motivational and emotional needs. However, these definitions do not fully reflect the deeper, learning-oriented functions of feedback.

Students' Views on the Necessity of Feedback and Its Contribution to Academic Achievement

Students' responses to the sub-problem "What are middle school students' thoughts on the necessity of feedback and its contribution to mathematics achievement?" are presented in Table 8.

Table 8. Students' views on the necessity of feedback and its contribution to mathematics achievement

Category	Code	f
The necessity of feedback	Ensuring homework completion	4
	Providing motivation	3
	Detecting mistake	1
	Acknowledging effort	1
	Promoting responsibility	1
Impact on achievement	Increasing achievement	4
	Enhancing understanding	1
	Learning what was previously misunderstood	1
	No impact on achievement	1
No feedback received	Decrease in achievement	2

According to Table 8, the majority of students stated that receiving feedback helped them complete their homework, while half of the students indicated that feedback increased their motivation. For example, student S5 remarked: "When teachers do not check the homework, students do not do it.

They really don't". These experiences suggest that students view feedback not only as part of their academic development but also as a source of emotional support. Students expressed that when they do not receive feedback, they feel as though their efforts are wasted. As student S1 stated: "When we do homework, we put in effort, and if we don't get feedback in return, it becomes a disappointment. We shouldn't feel that our effort was wasted when we complete our homework.". This statement illustrates that feedback is important to students not only for providing academic information but also for emotional satisfaction and validation of their efforts.

In addition, students mentioned that feedback helps in identifying mistakes and reinforces the sense of responsibility for completing homework. Furthermore, students expressed that feedback positively impacts their academic achievement, enhances their understanding of topics, and helps them learn how to solve problems they previously could not. As student S4 stated: "I believe receiving feedback on homework really has a positive impact on our success". These findings indicate that students perceive feedback as one of the factors contributing to their academic success. Moreover, several students noted that a lack of feedback could lead to a decline in their academic performance.

Students' Views on How They Would Like to Receive Feedback

The results of the analysis of students' views on the sub-problem "What are the views of middle school students on what kind of feedback they want to receive?" are given in Table 9.

Table 9. Students' views on how they would like to receive feedback

Code	f
Solving together with the teacher	4
Create a plus-minus list	2
Giving rewards	1
Asking for the student's view	1

According to Table 10, the majority of students preferred that homework assignments be reviewed and solutions be worked out collaboratively with the teacher. For example, student S3 stated: "I would solve it together with those who couldn't do it.". These finding highlights students' desire to actively participate in the learning process through guided interaction. Two students preferred the creation of plus-minus lists, while one student mentioned that gestures of appreciation, such as offering small rewards, would enhance their motivation. For instance, student S2 explained: "If I were a mathematics teacher, after assigning homework, I would create a plus-minus list and assign pluses and minuses". These preferences show that students value guidance, recognition, and clear evaluation of results in the feedback process.

Students' Views on the Advantages and Disadvantages of Feedback Received During Distance and Face-to-Face Education

The analysis results of students' responses to the sub-problem "What are the advantages and disadvantages of feedback received by middle school students during distance and face-to-face education periods?" are presented in Table 10.

Table 10. Students' views on the advantages and disadvantages of feedback received during distance and face-to-face education

Category	Code	f
Advantages during the distance education	Receiving better feedback	1
	One-to-one control	1
Disadvantages during the distance education	Difficulty in understanding questions	4
	Lack of regular control	3
	Delay in solving questions	1
	Internet connection problems	1
	Providing inaccurate information about homework	1
Advantages during face-to-face education	Ability to evaluate effectively	4
	Supportive feedback	1
	Providing physical feedback	1
	Ability to communicate	1

As seen in Table 10, students reported some advantages regarding feedback during distance education. They stated that due to lower student participation in online classes, feedback was more individualized, and they received one-on-one evaluations. For instance, student S2 remarked: "The feedback given by teachers during distance education was better because fewer students were attending the classes" while student S4 added: "The teacher could check the homework individually when we submitted it". Regarding the disadvantages of distance education, students emphasized that receiving feedback was more challenging and that there was a lack of regular homework checking. This experience shows that distance education introduced significant difficulties in the feedback process for students. Student S3 explained: "The advantage of face-to-face education is that the teacher can explain the question more clearly, and if I don't understand something, I can ask 'why is this so?' directly. The teacher can explain it in person, but during distance education, this wasn't possible. The teacher would explain it on a piece of paper, but sometimes I couldn't understand everything". Additional disadvantages mentioned by students included delays in problem-solving, internet connectivity issues, and instances where students provided inaccurate information about homework completion. For example, student S6 noted: "Some of our classmates could log in to the online classes while others couldn't. As a result, we were missing some topics. In face-to-face education, the teacher checks everyone's homework". These experiences reveal the difficulties students faced in receiving immediate feedback during distance education. In contrast, during face-to-face education, students emphasized that the evaluation of homework was more accurate, that they received more supportive and physical feedback, and that direct communication with teachers was possible. These findings suggest that students perceive feedback in face-to-face education as more effective and view communication with teachers as significantly better compared to distance education.

Discussion, Conclusion and Recommendations

Discussion and Conclusion Regarding Teachers' Views

The aim of this study was to examine how elementary mathematics teachers' feedback on homework assignments is perceived from both teacher and student perspectives. In the study, teachers' and students' perceptions of feedback on homework, the challenges they encountered during this process, and the effects of feedback on the educational process were analyzed in detail. The results were discussed based on the views of mathematics teachers and students regarding feedback.

According to the findings, most teachers defined feedback as "homework checking" viewing it primarily as a tool for monitoring students' learning progress and correcting errors. Nevertheless, limiting feedback to a control mechanism restricts its potential to deepen learning and provide meaningful guidance. As emphasized by Hattie and Timperley (2007), effective feedback should foster active participation and promote critical thinking. Therefore, teachers must reconceptualize feedback as a comprehensive learning tool (Avcı et al., 2025). In addition, feedback should function not merely as an evaluation method but as a means of supporting and reinforcing instruction. Consistently, Núñez et al. (2015) demonstrated that teacher feedback significantly enhances students' academic performance. However, the inability of one teacher to clearly define feedback highlights a conceptual gap in feedback practices.

The findings further revealed that all teachers emphasized the necessity of feedback. They viewed feedback as essential for identifying students' deficiencies, reinforcing learning, and fostering inquiry skills. Particularly in mathematics, where repetition and practice are vital, teachers believed feedback supports learning and consolidates knowledge. Moreover, they recognized feedback as a mechanism for re-engaging students in the learning process and reinforcing content, thereby contributing positively to academic development. This finding aligns with prior research underscoring the importance of feedback in mathematics education. For example, Xu (2024a) emphasized that feedback critically enhances students' problem-solving skills. Additionally, teachers noted that feedback enables students to better assess their own learning processes.

When examining teachers' views on feedback, most emphasized the importance of reviewing students' homework solutions, particularly focusing on whether solutions were completed correctly. However, concentrating primarily on outcomes risks rendering feedback superficial. As Brookhart (2017) notes, effective feedback should focus on both outcomes and processes to deepen students' understanding of learning. Furthermore, teachers reported evaluating whether students achieved learning outcomes and analyzing their problem-solving processes. They adopted an approach aimed at identifying the sources of students' mistakes, emphasizing the importance of guiding students to understand not just errors but underlying reasoning. Providing process-oriented feedback can thus promote deeper learning beyond correct

answers (Dobbs et al., 2025). Investigating error sources and offering targeted guidance emerges as an effective feedback strategy.

Research further highlights that feedback is more effective when it focuses on development rather than mere verification (Gou et al., 2024; Hattie & Timperley, 2007). In line with this, teachers reported using methods such as providing feedback on the board and examining errors individually. Similarly, Rosário et al. (2019) found that middle school mathematics teachers believed homework feedback—through praise, criticism, or board reviews—could foster student engagement. Teachers also noted that reviewing homework on the board could enhance students' self-regulation by encouraging reflection on mistakes and learning alternative strategies. Additionally, some teachers emphasized the importance of providing quick feedback by addressing errors promptly during lessons.

However, the findings also revealed that time constraints were a major difficulty for teachers. All participants reported struggling to provide feedback within limited instructional time. As noted by Shute (2008), time and workload pressures can significantly reduce the effectiveness of feedback. Similarly, Black and Wiliam (1998) emphasized that time limitations often restrict effective feedback practices. Addressing these challenges requires improved time management and the adoption of more efficient feedback strategies. Moreover, half of the teachers indicated that students' solutions were often unclear, complicating the feedback process. This issue is consistent with previous findings, where timely and clear feedback is crucial for helping students understand their mistakes (Hattie & Timperley, 2007). Teachers also cited large class sizes as an additional obstacle, further demonstrating how instructional conditions limit their ability to provide effective, individualized feedback.

Clear differences between feedback processes during distance and face-to-face education emerged from the findings. All teachers reported that distance education offered no advantages for feedback. They faced significant challenges, including technological issues, the inability to provide physical feedback, and insufficient communication with students. The lack of one-on-one interaction and technological inadequacies made it difficult to deliver effective feedback remotely. Consistently, the literature highlights the negative effects of distance education on feedback processes (Bozkurt & Sharma, 2020), noting that poor technological infrastructure and communication breakdowns hinder effective teacher-student interaction.

In contrast, during face-to-face education, most teachers reported evaluating students' homework more effectively and providing more supportive feedback. These results align with research showing that feedback tends to be weaker in distance education contexts (Xu, 2024b). Teachers indicated that the physical presence of students allowed them to monitor learning more closely and deliver immediate feedback, making face-to-face education more advantageous for feedback processes. The literature similarly supports that face-to-face settings enable teachers to observe students' reactions and learning progress directly, enhancing feedback effectiveness (Cunha et al., 2018; Hattie &

Timperley, 2007). Moreover, Dumani and Gencel (2023) found that in-person interactions, such as reviewing homework on the board, foster emotional engagement and collaboration. Such real-time feedback processes help students feel supported and engaged, contributing positively to their homework experiences.

Discussion and Conclusion Regarding Students' Views

The findings indicate that students predominantly defined feedback through superficial and symbolic forms such as "assigning plus or minus marks" or "saying well done". All participants perceived feedback mainly through such evaluative expressions, suggesting they experienced feedback largely as brief, motivational responses. However, literature shows that detailed and individualized feedback contributes more significantly to students' learning processes (Rosário et al., 2019). For students, feedback often functioned as approval or simple guidance, reinforcing the impression that teacher feedback was surface-level. Yet, effective feedback should deepen learning and offer clear pathways for improvement (Xu, 2024a). Therefore, teachers must reconsider their feedback strategies to foster more active engagement and meaningful learning experiences.

Most students reported that homework feedback motivated them to complete assignments and enhanced their academic performance. They also stated that the absence of feedback could lead to a decline in achievement. These findings reveal a strong perceived need for feedback, aligning with Xu's (2024a, 2024b) research emphasizing its positive effects on motivation and self-regulation.

Moreover, students associated feedback not only with academic success but also with emotional satisfaction and increased motivation. Recognizing feedback as essential for both cognitive and emotional development highlights its critical role in learning. As the literature suggests, feedback strengthens intrinsic motivation, making students feel more secure and successful, whereas its absence leads to reduced motivation and feelings of unacknowledged effort (Gou et al., 2024; Rosário et al., 2019).

The opportunity for students to recognize their mistakes and improve through feedback supports its positive impact on learning (Shute, 2008). However, to be truly effective, feedback must move beyond identifying errors and offer constructive guidance that fosters learning development (Cunha et al., 2018). The strong need for feedback and its motivational role suggest that teachers should adopt more careful and systematic feedback approaches. Overall, feedback serves not only as a tool for academic growth but also addresses students' emotional and motivational needs. Receiving positive and constructive feedback enhances academic achievement and fosters intrinsic motivation toward learning.

Findings on students' feedback preferences are also noteworthy. Students expressed a desire for feedback processes involving active participation, with most preferring homework to be reviewed and solved collaboratively with teachers. This preference indicates students' expectations for greater

guidance and support, as well as the structural role of feedback in promoting engagement and supporting learning processes.

Research shows that individualized and explanatory feedback leads to deeper student engagement (Núñez et al., 2015), while students' preference for external feedback supports findings by Güven and Akçay (2019). Additionally, students mentioned plus-minus lists and rewards as preferred feedback methods. Although symbolic feedback, such as rewards, can enhance motivation, it tends to support extrinsic rather than intrinsic motivation. Thus, effective feedback should not only indicate correct or incorrect responses but also provide clear guidance for improvement, enriching the learning process (Hattie & Timperley, 2007).

Students identified certain advantages of receiving feedback during distance education, noting that smaller class sizes allowed for more individualized feedback. However, most students also reported difficulties in understanding questions, and nearly half highlighted the lack of regular feedback control. Additional challenges included delays in problem-solving and internet connectivity issues. Overall, students perceived the feedback process during distance education as limited and problematic. Insufficient technological infrastructure and a lack of meaningful interaction prevented them from fully benefiting from feedback. Research similarly shows that such issues significantly reduce the efficiency of feedback in distance education (Bozkurt & Sharma, 2020). Low student participation and difficulties in understanding tasks further undermined the effectiveness of feedback and revealed the disadvantages of remote learning.

In contrast, students reported that feedback during face-to-face education was healthier and more effective. Most attributed this to the opportunity for direct communication with teachers and emphasized the value of supportive and physical feedback. Face-to-face education was thus seen as more effective for feedback processes, with the physical presence of teachers and students facilitating faster, real-time, and more explanatory feedback. These findings suggest that face-to-face environments enable stronger feedback processes and allow teachers to provide more meaningful guidance (Dumani & Gencel, 2023).

Recommendations

According to the findings, teachers generally perceive feedback as homework control. However, effective feedback should extend beyond verifying correct completion and serve as a tool to support instruction, develop critical thinking skills, and deepen learning (Xu, 2024a). Thus, teachers should receive training to provide more directive and developmental feedback, with an emphasis on addressing both outcomes and learning processes.

The study also reveals that teachers face significant time constraints when giving feedback, a challenge that hinders its effectiveness (Lizzio & Wilson, 2008). To manage feedback more efficiently,

teachers could improve their time management skills and utilize technology-supported feedback tools. For instance, online platforms can facilitate faster and more effective feedback delivery, while collective feedback strategies in the classroom may further enhance time management.

Findings regarding students indicate that they perceive feedback as largely superficial and symbolic, often limited to brief, motivational responses. This restricts their active engagement in the feedback process. Providing more detailed and individualized feedback could better support students' learning (Cunha et al., 2019). Therefore, teachers should adopt strategies that encourage students' active involvement, such as incorporating self-evaluation opportunities during feedback sessions.

The study found that feedback processes in distance education were fraught with difficulties. A lack of technological infrastructure and weak student–teacher connections negatively impacted the effectiveness of feedback. To address these challenges, teachers should be better equipped with technological tools and online platforms. Additionally, using visual and interactive feedback tools may help provide more effective feedback in distance education environments. In contrast, findings indicate that feedback processes were more efficient during face-to-face education. One-on-one interaction enabled teachers to deliver more meaningful feedback and closely monitor students' learning (Guo et al., 2024). To maximize this advantage, teachers should develop targeted classroom feedback strategies, such as immediately reviewing and correcting student errors on the board. Providing instructive and guiding feedback in real time can enhance the learning process.

However, the results also show that teachers often focused primarily on whether students' answers were correct or incorrect, with limited attention to guiding learning processes. This approach risks encouraging students to focus only on results rather than deeper learning. Therefore, it is recommended that teachers offer more process-oriented feedback, evaluating students' thinking and problem-solving strategies. Such feedback can help students understand both their outcomes and the sources of their mistakes, thereby strengthening learning.

Limitations

This study has certain limitations. First, the participants consisted only of elementary mathematics teachers and students from a specific region, meaning the findings are context-specific. Future studies could expand to different regions and include participants from diverse socioeconomic and cultural backgrounds to enhance generalizability. Second, data collection relied solely on focus group interviews, which captured participants' perceptions rather than direct observations of classroom practices. Mixed-methods research combining qualitative and quantitative data could provide a more objective and comprehensive understanding. For example, video recordings or classroom observations could be used to collect quantitative data to examine the long-term effects of feedback on students' academic achievement.

Policy Implications

The findings of this study indicate several important implications for educational policy in the context of feedback on mathematics homework. First, the concept of feedback may be integrated into the structure of teacher education and professional development programs. Within these programs, it should be emphasized that feedback is not merely a matter of homework control, but rather a pedagogical tool that guides student learning, supports metacognitive development, and enhances academic achievement. Teachers can be equipped with practical strategies to deliver constructive, process-oriented, and individualized feedback. Moreover, time constraints have emerged as one of the primary barriers to effective feedback. Therefore, it is important for policymakers to allocate specific time for feedback in the restructuring of curricula and lesson durations. Reducing class sizes or providing additional instructional support may also facilitate the delivery of more personalized and higher-quality feedback.

Considering the technological difficulties and communication barriers encountered during distance education, it is recommended that investments be made in digital infrastructure and that teachers receive training on how to use online feedback tools effectively. In addition, education authorities may develop clear and practical guidelines that can be implemented across schools to standardize the content, duration, and methods of feedback. Finally, policies should promote a culture of formative assessment, which prioritizes ongoing, process-based feedback rather than merely summative evaluation. Supporting hybrid feedback practices and implementing policies that encourage more active parental involvement in the feedback process may also contribute to more effective management in future instances where distance education becomes necessary. Altogether, these policy actions can help transform feedback from a routine administrative task into a powerful pedagogical instrument that fosters student engagement and academic success.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding Details

The authors did not receive support from any organization for the submitted work.

Ethical Statement

The research received ethical approval, confirming its adherence to relevant guidelines and regulations. Specifically, for this study, approval was granted by the Fırat University Social and Human Sciences Scientific Research Ethics Committee (dated 27.04.2021, meeting no:10 decision no:6)

Credit Author Statement

EM: Writing-original draft, Investigation, Methodology, Formal analysis, AG: Conceptulization, Supervision, Methodology, FE: Writing-review & editing, Methodology, Visualization.

References

Arikan, S. (2017). The relationship between homework and mathematics achievement in Turkey according to TIMSS 2011 data. *International Journal of Eurasia Social Sciences, 8*(26), 256-276.

Avcı, S., Özgenel, M., Çakır, M., & Yapıcı, S. (2025). Adaptation of the teacher homework reasons scale into Turkish and development of the teacher homework feedback frequency scale. *International Journal of Psychology and Educational Studies, 12*(2), 141-153. https://dx.doi.org/10.52380/ijpes.2025.12.2.1385

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy and Practice, 5*(1), 7-74.

Bozkurt, A, & Sharma, R C. (2020). Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. *Asian Journal of Distance Education, 15,* 1-6.

Brookhart, S. M. (2017). *How to give effective feedback to your students.* ASCD.

Cooper, H. (1989). *Homework.* Longman.

Cooper, H. (2007). *The battle over homework: Common ground for administrators, teachers, and parents* (3rd ed.). Corwin Press. https://doi.org/10.4135/9781483329420

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches.* Sage publications.

Cunha, J., Rosário, P., Núñez, J. C., Nunes, A. R., Moreira, T., & Nunes, T. (2018). "Homework feedback is…": Elementary and middle school teachers' conceptions of homework feedback. *Frontiers in Psychology*, *9*, 32. https://doi.org/*10.3389/fpsyg.2018.00032*

Cunha, J., Rosário, P., Núñez, J. C., Vallejo, G., Martins, J., & Högemann, J. (2019). Does teacher homework feedback matter to 6th graders' school engagement? A mixed methods study. *Metacognition and Learning, 14*(2), 89–129. https://doi.org/10.1007/s11409-019-09200-z

Dettmers, S., Trautwein, U., Lüdtke, O., Kunter, M., & Baumert, J. (2010). Homework works if homework quality is high: Using multilevel modeling to predict the development of achievement

in mathematics. *Journal of Educational Psychology, 102*(2), 467–482. https://doi.org/10.1037/a0018453

Dobbs, C. L., Leider, C. M., Bempechat, J., & Jimenez-Silva, M. (2025). "Just for the sake of giving it:" An exploration of elementary teachers' beliefs about homework practices. *Journal of Education*, *205*(1), 30-43. https://doi.org/10.1177/00220574241235685

Dumani, B., & Gencel, N. (2023). Comparison of face-to-face and distance education: An example of a vocational high school. *International Journal of Progressive Education, 19*(1), 131–153. https://doi.org/10.29329/ijpe.2023.517.9

Ergen, Y. & Durmuş, M. E. (2021). The experiences of classroom teachers on the homework process in teaching mathematics: An interpretative phenomenological analysis. *Journal of Pedagogical Research, 5*(1), 293-314. http://dx.doi.org/10.33902/JPR.2021167935

Erlandson, D. A., Harris, E. L., Skipper, B. L., & Allen, S. T. (1993). *Doing naturalistic inquiry: A guide to methods.* Sage.

Esterhazy, R., Fossland, T., & Stalheim, O. R. (2020). What counts as quality feedback? Disciplinary differences in students' and teachers' perceptions of feedback. In M. Elken, P. Maassen, M. Nerland, T. Prøitz, B. Stensaker, & A. Vabø (Eds.), *Quality work in higher education* (pp. 155–174). Springer. https://doi.org/10.1007/978-3-030-41757-4_9

Fan, H., Xu, J., Cai, Z., He, J., & Fan, X. (2017). Homework and students' achievement in math and science: A 30-year metaanalysis, 1986–2015. *Educational Research Review, 20,* 35–54. https://doi.org/10.1016/j.edurev.2016.11.003

Fern´andez-Alonso, R., Su´arez-´Alvarez, J., & Mu˜niz, J. (2015). Adolescents' _homework performance in mathematics and science: Personal factors and teaching practices. *Journal of Educational Psychology, 107*(4), 1075–1085. https://doi.org/10.1037/edu0000032

Gou, R., Yang, X., Chen, X., Cao, C., & Chen, N. (2024). The relationship between teachers' homework feedback, students' homework emotions, and academic self-esteem: A multi-group analysis of gender differences. *Social Psychology of Education*, 1-31. https://doi.org/10.1007/s11218-024-09897-0

Güven, U., & Akçay, A. O. (2019). Trends of homework in mathematics: Comparative research based on TIMSS Study. *International Journal of Instruction*, *12*(1), 1367-1382.

Hargreaves, E. (2013). Inquiring into children's experiences of teacher feedback: Reconceptualising assessment for learning. *Oxford Review of Education, 39*(2), 229–246.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81-112. https://doi.org/10.3102/003465430298487

Kaplan-Can, G. & Gelbal, S. (2022). Ortaokul öğrencilerine verilen matematik ev ödevleri hakkında öğrenci, öğretmen ve veli görüşleri. *Kırşehir Eğitim Fakültesi Dergisi, 23*(1), 863-922. http://dx.doi.org/10.29299/kefad.894138

van der Kleij, F. M. (2019). Comparison of teacher and student perceptions of formative assessment feedback practices and association with individual student characteristics. *Teaching and Teacher Education, 85,* 175–189. https://doi.org/10.1016/j.tate.2019.06.010

Lizzio, A., & Wilson, K. (2008). Feedback on assessment: Students' perceptions of quality and effectiveness. *Assessment & evaluation in higher education*, *33*(3), 263-275.

Merriam, S. B. (2018). *A guide to qualitative research design and implementation* (Trans. Ed. S. Turan). Nobel Publ.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook.* Sage.

Núñez, J. C., Suárez, N., Rosário, P., Vallejo, G., Cerezo, R., & Valle, A. (2015). Teachers' feedback on homework, homework-related behaviors, and academic achievement. *The Journal of Educational Research*, 108(3), 204-216. https://doi.org/10.1080/00220671.2013.878298

Özcan, Z. Ç., & Erktin, E. (2015). Enhancing mathematics achievement of elementary school students through homework assignments enriched with metacognitive questions. *Eurasia Journal of Mathematics, Science and Technology Education*, *11*(6), 1415-1427. https://doi.org/10.12973/eurasia.2015.1402a

Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage.

Rosário, P., Cunha, J., Nunes, A. R., Moreira, T., Núñez, J. C., & Xu, J. (2019). "Did you do your homework?" Mathematics teachers' homework follow-up practices at middle school level. *Psychology in the Schools*, 56(1), 92-108. https://doi.org/10.1002/pits.22198.

Sharts-Hopko, N. C. (2002). Assessing rigor in qualitative research. *Journal of the Association of Nurses in Aids Care, 13*(4), 84-86.

Shute, V. J. (2008). Focus on formative feedback. *Review of educational research, 78*(1), 153-189. https://doi.org/10.3102/0034654307313795

Trautwein, U., & Lüdtke, O. (2009). Predicting homework motivation and homework effort in six school subjects: The role of person and family characteristics, classroom factors, and school track. *Learning and Instruction, 19*(3), 243–258. https://doi.org/10.1016/j.learninstruc.2008.05.001

Trautwein, U., Lüdtke, O., Schnyder, I., & Niggli, A. (2006). Predicting homework effort: Support for a domain-specific, multilevel homework model. *Journal of Educational Psychology, 98*(2), 438–456. https://doi.org/10.1037/0022-0663.98.2.438

Xu, J. (2022). Investigating factors that influence math homework purposes: A multilevel analysis. *The Journal of Experimental Education, 90*(4), 862–883. https://doi.org/10.1080/00220973.2020.1810604

Xu, J. (2024a). Student perceptions of teacher feedback quality in homework: Individual and class-level factors. *Psychology in the Schools*, *61*(7), 3026-3044. https://doi.org/10.1002/pits.23203

Xu, J. (2024b). Student-perceived teacher and parent homework involvement: Exploring latent profiles and links to homework behavior and achievement. *Learning and Individual Differences*, *109*, Article 102403. https://doi.org/10.1016/j.lindif.2023.102403

Xu, J. Z., & Corno, L. (2006). Gender, family help, and homework management reported by rural middle school students. *Journal of Research in Rural Education, 21*(2), 1-13.

Xu, J., & Corno, L. (2022). Extending a model of homework: A multilevel analysis with Chinese middle school students. *Metacognition and Learning, 17*(2), 531–563. https://doi.org/10.1007/s11409-022-09296-w

Xu, J., Wang, C., Du, J., & Núñez, J. C. (2022). Profiles of student-perceived teacher homework involvement, and their associations with homework behavior and mathematics achievement: A person-centered approach. *Learning and Individual Differences*, *96*, 102159. https://doi.org/10.1016/j.lindif.2022.102159

Xu, J., & Wu, H. (2013). Self-regulation of homework behavior: Homework management at the secondary school level. *The Journal of Educational Research*, *106*(1), 1-13. https://doi.org/10.1080/00220671.2012.658457